

CLAIMS

1. A method of manufacturing a micro reactor device that includes a tubular reactor as a flow path and allows reaction species to react in the reactor, the method comprising the step of:

forming a particle layer including particles on an inner wall of the reactor.

2. The method as set forth in claim 1, wherein: the particle layer is formed by causing a dispersion liquid of particles to flow through the reactor and drying the reactor.

3. The method as set forth in claim 1 or claim 2, wherein:

in the particle layer, the particles are aligned regularly.

4. The method as set forth any one of claims 1 to 3, wherein:

a solvent of the dispersion liquid is a mixed solvent including at least two kinds of solvents.

5. The method as set forth in any one of claims 1 to 4, wherein:

the flow path has a cross section of a round or elliptical shape.

6. The method as set forth in any one of claims 1 to 5, wherein:

the particles are a catalyst.

7. The method as set forth in any one of claims 1 to 5, wherein:

a catalyst is supported by the particle layer.

8. The method as set forth in any one of claims 1 to 5, wherein:

the particle layer includes composite particles formed by supporting a functional material by the particles.

9. The method as set forth in claim 8, wherein:
in the composite particles, the functional material covers the particles.

10. The method as set forth in claim 8 or claim 9, wherein:

the composite particles are formed by a heterocoagulation method.

11. The method as set forth in any one of claims 8 to 10, wherein,

the composite particles are formed by controlling a surface charge of the particles by a surface-active agent.

12. The method as set forth in any one of claims 1 to 3 or 5 to 11, wherein:

a hydrophilicity process and a hydrophobicity process are performed on desired regions of the inner wall of the reactor, and a water dispersion liquid of particles is caused to flow through the reactor.

13. The method as set forth in claim 12, wherein:

the particles are a conductive material, and electrodes are formed by sintering the particles.

14. The method as set forth in any one of claims 1 to 5, wherein:

using the particle layer as a mold, a layer is formed by filling spaces between the particles of the particle layer with sol or nanoparticles and solidifying the sol or nanoparticles, and the particles of the particle layer are removed.

15. The method as set forth in claim 14, wherein:

the particles are removed by thermal decomposition.

16. The method as set forth in claim 14 or claim 15, wherein:

a catalyst is supported by the layer formed by filling and solidifying the sol or nanoparticles.

17. A micro reactor device, comprising a tubular reactor as a flow path, for allowing reaction species to react in the reactor, the micro reactor device further comprising:

a particle layer including particles, provided on an inner wall of the reactor.

18. The micro reactor device as set forth in claim 17, wherein:

in the particle layer, the particles are aligned regularly.

19. The micro reactor device as set forth in claim 17 or claim 18, wherein:

the flow path has a diameter between 1 μ m and 1mm.

20. The micro reactor device as set forth in claim 17 or claim 18, wherein:

the particles of the particle layer have a diameter between 1nm and 10 μ m.

21. The micro reactor device as set forth in claim 17 or claim 18, wherein:

the particle layer has a thickness of not more than 20 μ m.

22. The micro reactor device as set forth in any one of claims 17 to 21, wherein:

the particles are a catalyst.

23. The micro reactor device as set forth in any one of claims 17 to 21, wherein:

the particles are composite particles supporting a functional material.

24. The micro reactor device as set forth in claim 23, wherein:

the composite particles are covered particles that are the particles covered with the functional material.

25. The micro reactor device as set forth in any one of claims 17 to 24, wherein:

the particle layer is patterned.

26. (Amended) A micro reactor device, comprising a tubular reactor as a flow path, for allowing reaction species to react in the reactor, the micro reactor device further comprising:

electrodes made of particles, provided on an inner wall of the reactor.

27. (New) The micro reactor device as set forth in claim 26, wherein:

the electrodes are patterned.

28. (Amended) A micro reactor device, comprising a tubular reactor as a flow path, for allowing reaction species to react in the reactor, the micro reactor device further comprising:

a layer having particle-shaped pores, provided on an inner wall of the reactor.

29. (Amended) The micro reactor device as set forth in claim 28, wherein:

the particle-shaped pores are aligned regularly.

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